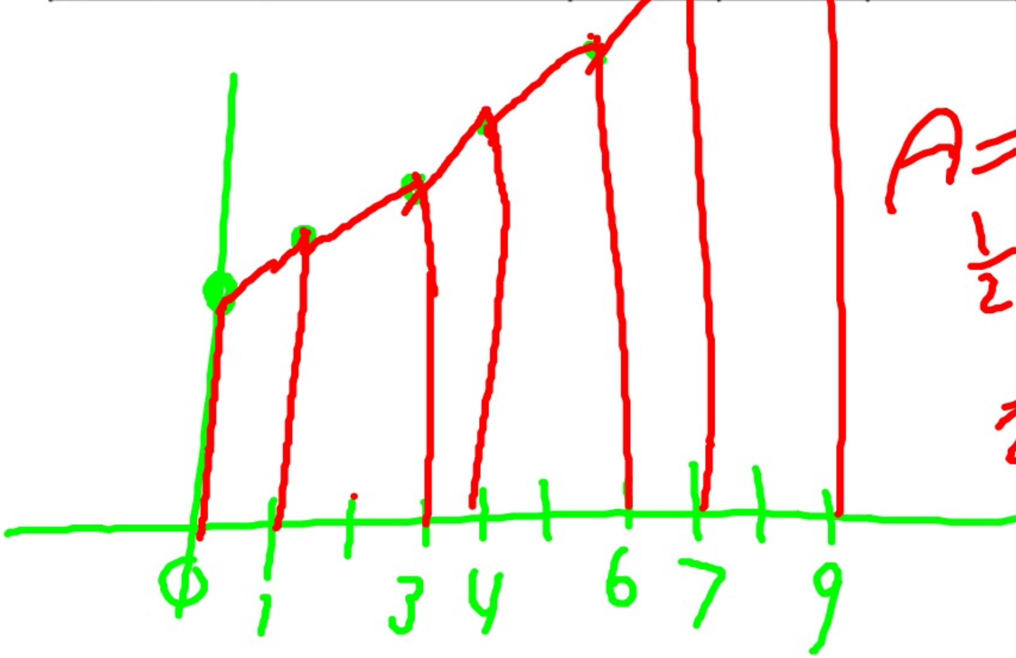
Section 5.5
Trapezoidal Rule

$A = \frac{1}{2}h(b_1 + b_2)$

6. Coal gas is produced at a gasworks. Pollutants in the air are removed by scrubbers, which become less and less efficient as time goes on. Measurements are made at the start of each month (although some months were neglected) showing the rate at which pollutants in the gas are as follows. Use trapezoids to estimate the total number of tons of coal removed over 9 months.

Time (months)	0	1	3	4	6	7	9
Rate pollutants are escaping (tons/month)	5	7	8	10	13	16	20

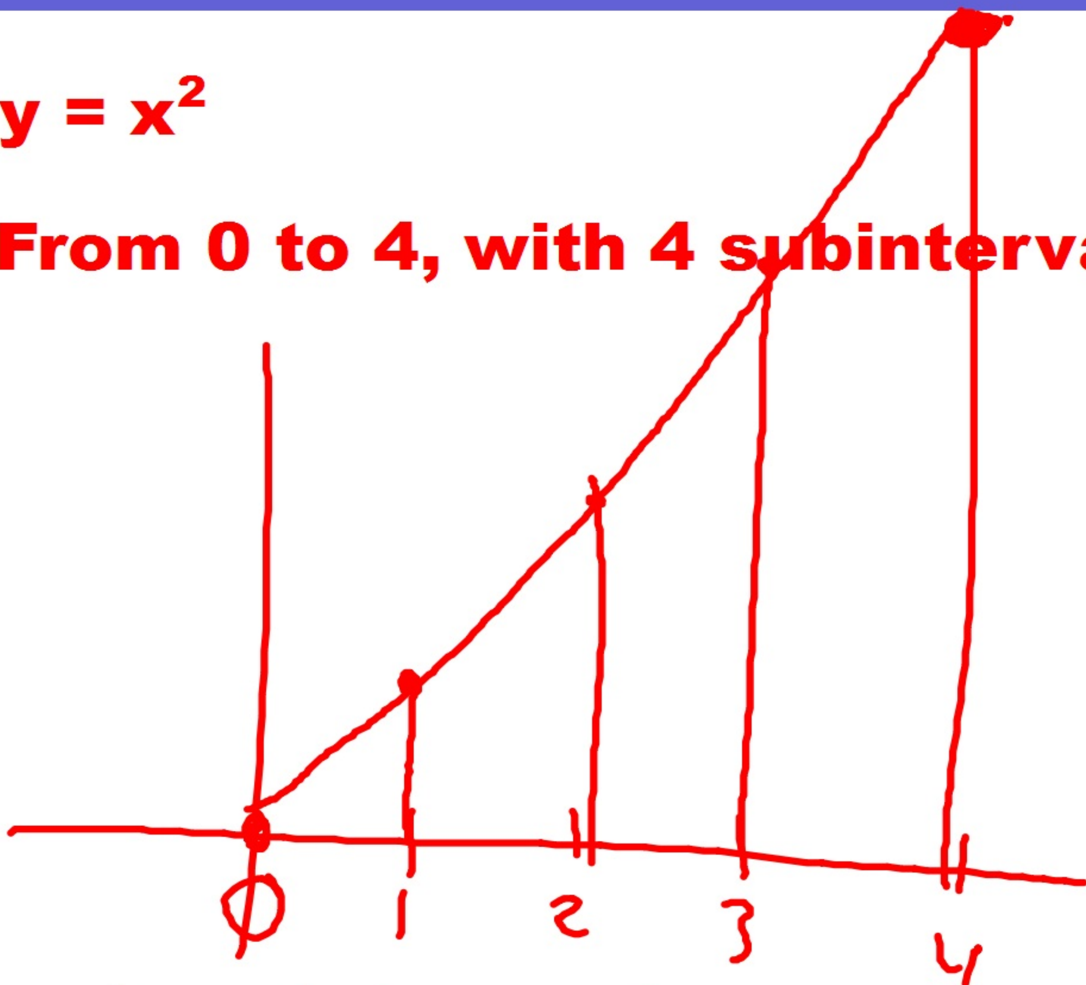


$A = \frac{1}{2}(1)(5+7) + \frac{1}{2}(2)(7+8) + \frac{1}{2}(2)(10+13) +$
$\frac{1}{2}(1)(8+10) + \frac{1}{2}(2)(16+20)$
$\frac{1}{2}(1)(13+16) + \frac{1}{2}$

$=$

$y = x^2$

From 0 to 4, with 4 subintervals



$A = \frac{1}{2}(1)(0+1) + \frac{1}{2}(1)(1+4) + \frac{1}{2}(1)(4+9) +$
$\frac{1}{2}(1)(9+16) =$

Use the Trapezoidal Rule with n = 4 to estimate $\int_1^2 x^2\,dx$. Compare the estimate with the value of NINT $(x^2, x, 1, 2)$ and with the exact value.

$$\int_1^2 x^2\,dx = \frac{x^3}{3}\Big|_1^2$$

$$= \frac{8}{3} - \frac{1}{3} = \frac{7}{3}$$

Time (seconds)	Velocity (in/sec
0	0
2	22
4	5
6	11
8	2
10	0

Approximate the distance travelled using

a.) LRAM

b.) Trapezoids

page 312, numbers 3,5,7

Use the trapezoidal rule to estimate the area under the curve for the graph of $y = 2(x+2)^{1/2}$ from $x = -1$ to $x = 4$, use 5 subintervals

Use the graph from one and RRAM to estimate the area under the curve from $x = -1$ to $x = 5$. Use three subintervals.

The trapezoidal rule overestimates the integral where the graph is concave up and underestimates the integral where the graph is concave down.